

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 13-26.B.WO	<b>FOR FURTHER ACTION</b> see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/IB2005/051049	International filing date (day/month/year) 29/03/2005	(Earliest) Priority Date (day/month/year) 30/03/2004
Applicant ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE (EPFL)		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 6 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box II).

3. ☐ **Unity of invention is lacking** (see Box III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 1

☐ as suggested by the applicant.

☒ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB2005/051049

Box No. IV Text of the abstract (Continuation of item 5 of the first sheet)

The invention relates to a light phase modulator, which is based on a multi-gate transistor, sandwiching a Silicon-on-Insulator manowine used as an optical waveguide

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International Application No

PCT/IB2005/051049

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 G02F1/025

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC, WPI Data, PAJ, IBM-TDB, COMPENDEX

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	IONESCU A M ET AL: "Emerging nanoelectronics: multi-functional nanowires" SEMICONDUCTOR CONFERENCE, 2004. CAS 2004 PROCEEDINGS. 2004 INTERNATIONAL SINAIA, ROMANIA 4-6 OCT. 2004, PISCATAWAY, NJ, USA, IEEE, US, vol. 1, 4 October 2004 (2004-10-04), pages 3-8, XP010775905 ISBN: 0-7803-8499-7 the whole document ----- -/--	1-7



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

29 July 2005

Date of mailing of the international search report

14/09/2005

Name and mailing address of the ISA

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CRISTOLOVEANU S: "Silicon on insulator technologies and devices: from present to future" SOLID STATE ELECTRONICS, ELSEVIER SCIENCE PUBLISHERS, BARKING, GB, vol. 45, no. 8, August 2001 (2001-08), pages 1403-1411, XP004317761 ISSN: 0038-1101 figure 2	1-7
X	----- PARK J-T ET AL: "MULTIPLE-GATE SOI MOSFETS: DEVICE DESIGN GUIDELINES" IEEE TRANSACTIONS ON ELECTRON DEVICES, IEEE INC. NEW YORK, US, vol. 49, no. 12, December 2002 (2002-12), pages 2222-2229, XP001142762 ISSN: 0018-9383 the whole document	1-5,7
A	----- DATABASE INSPEC 'Online! THE INSTITUTION OF ELECTRICAL ENGINEERS, STEVENAGE, GB; 7 November 2002 (2002-11-07), LAUHON L J ET AL: "Epitaxial core-shell and core-multishell nanowire heterostructures" XP002338449 Database accession no. 7520987 the whole document & Nature Nature Publishing Group UK, vol. 420, no. 6911, 7 February 2002 (2002-02-07), pages 57-61, ISSN: 0028-0836	1-7
A	----- WONG H P ET AL: "NANOSCALE CMOS" PROCEEDINGS OF THE IEEE, IEEE. NEW YORK, US, vol. 87, no. 4, April 1999 (1999-04), pages 537-569, XP000902774 ISSN: 0018-9219 the whole document	1-7
A	----- LIU A ET AL: "A HIGH-SPEED SILICON OPTICAL MODULATOR BASED ON A METAL-OXIDE-SEMICONDUCTOR CAPACITOR" NATURE, MACMILLAN JOURNALS LTD. LONDON, GB, vol. 427, 12 February 2004 (2004-02-12), pages 615-618, XP001188890 ISSN: 0028-0836 the whole document	1-7
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International Application No

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	HONG GOO CHOI ET AL: "A low power SOI MOSFET photodetector with a nanometer scale wire for highly integrated circuit" MICROPROCESSES AND NANOTECHNOLOGY CONFERENCE, 2003. DIGEST OF PAPERS. 2003 INTERNATIONAL OCT. 29-31, 2003, PISCATAWAY, NJ, USA, IEEE, 29 October 2003 (2003-10-29), pages 296-297, XP010684489 ISBN: 4-89114-040-2 the whole document	1-7
A	TANG C K ET AL: "Highly efficient optical phase modulator in SOI waveguides" ELECTRONICS LETTERS, IEE STEVENAGE, GB, vol. 31, no. 6, 16 March 1995 (1995-03-16), pages 451-452, XP006002586 ISSN: 0013-5194 the whole document	1-7
A	US 6 298 177 B1 (HOUSE ANDREW ALAN) 2 October 2001 (2001-10-02) figure 5	1-7
A	WO 03/044590 A (INTEL CORPORATION) 30 May 2003 (2003-05-30) figures 1,2	1-7

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/IB2005/051049

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 6298177	B1	02-10-2001	GB	2348293 A	27-09-2000
			AU	3441800 A	16-10-2000
			EP	1166172 A1	02-01-2002
			WO	0058776 A1	05-10-2000
			JP	2002540469 T	26-11-2002
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			AU	2002360360 A1	10-06-2003
			CA	2465830 A1	30-05-2003
			EP	1446696 A1	18-08-2004
			WO	03044590 A1	30-05-2003